from the measured cut-off range. **FIG. 37** is a schematic diagram showing the principle of measuring the diameter of the cross section of the indicator S. In **FIG. 37**, D**1** and D**2** represent diameters of cross sections of the indicator S seen from the optical units **1***a* and **1***b*, respectively. First, distances OPc (r**1**) and BPc (r**2**) from the positions O (**0**, **0**) and B (L, **0**) of the optical units **1***a* and **1***b* to the central point Pc (Pcx, Pcy) of the indicator S are calculated as shown by equations (8) and (9) below.

$$OPc=r1=(Pcx^2+Pcy^2)^{1/2} \quad (8)$$

$$BPc=r2=\{(L-Pcx)^2+Pcy^2\}^{1/2} \quad (9)$$

[**0087**] Since the radius of the cross section of the indicator S can be approximated by the product of the distance to the central point and sine of a half of the cut-off angle, the diameters D**1** and D**2** of the cross sections are measurable according to equations (10) and (11) below.

$$D1=2\cdot r1\cdot\sin(d\theta/2)=2(Pcx^2+Pcy^2)^{1/2}\cdot\sin(d\theta/2) \quad (10)$$

$$D2=2\cdot r2\cdot\sin(d\phi/2)=2\{(L-Pcx)^2+Pcy^2\}^{1/2}\cdot\sin(d\phi/2) \quad (11)$$

[**0088**] Further, when $d\theta/2$, $d\phi/2\approx 0$, it is possible to approximate $\sin(d\theta/2)\approx d\theta/2\approx\tan(d\theta/2)$ and $\sin(d\phi/2)\approx d\phi/2\tan(d\phi/2)$, and therefore $d\theta/2$ or $\tan(d\theta/2)$, or $d\phi/2$ or $\tan(d\phi/2)$ may be substituted for $\sin(d\theta/2)$ and $\sin(d\phi/2)$ in equations (10) and (11).

INDUSTRIAL APPLICABILITY

[**0089**] As described above, in the optical scanning-type touch panel of the present invention, since the optical transceiver and the optical scanner are provided in a single base body as one unit, it is possible to readily perform the optical axis adjustment and positional adjustment of the respective optical members with high accuracy. As a result, highly accurate detection of the position and size of the indicator can be carried out.

1. An optical scanning-type touch panel comprising: an optical scanner for angularly scanning light in a plane substantially parallel to a predetermined region; and an optical transceiver for projecting light onto said optical scanner and receiving part of scanning light of said optical scanner; for measuring a scanning light cut-off position, which is produced in said predetermined region by an indicator, based on a light receiving output of said optical transceiver that corresponds to a scanning angle, said optical scanning-type touch panel being characterized in that

said optical scanner and said optical transceiver are mounted on a single base body.

2. An optical scanning-type touch panel comprising: an optical scanner for angularly scanning light in a plane substantially parallel to a predetermined region; and an optical transceiver for projecting light onto said optical scanner and receiving part of scanning light of said optical scanner; for measuring a scanning light cut-off position, which is produced in said predetermined region by an indicator, based on a light receiving output of said optical transceiver that corresponds to a scanning angle, said optical scanning-type touch panel being characterized in that

said optical scanner comprises a polygon mirror and a motor for rotating said polygon mirror,

said optical transceiver comprises a light emitting element, a collimation lens for changing light from said light emitting element into parallel light, a light receiving element for receiving part of said scanning light, an aperture mirror for limiting the parallel light from said collimation lens and reflecting part of said scanning light toward said light receiving element, a light receiving lens for focusing reflected light from said aperture mirror on said light receiving element, and a slit plate for limiting focused light from said light receiving lens, and

said polygon mirror, motor, light emitting element, collimation lens, light receiving element, aperture mirror, light receiving lens and slit plate are mounted on a single base body as one unit.

3. An optical scanning-type touch panel comprising: an optical scanner for angularly scanning light in a plane substantially parallel to a predetermined region; and an optical transceiver for projecting light onto said optical scanner and receiving part of scanning light of said optical scanner; for measuring a scanning light cut-off position, which is produced in said predetermined region by an indicator, based on a light receiving output of said optical transceiver that corresponds to a scanning angle, said optical scanning-type touch panel being characterized in that

said optical scanner and said optical transceiver are mounted on a single base body as one unit, and

a polygon mirror and a motor constituting said optical scanner are fixed with a single mounting member by interposing a movement adjusting ring and a polygon mirror pressing member between said polygon mirror and motor.

4. The optical scanning-type touch panel as set forth in claim 3,

wherein inside of said polygon mirror has a spot-facing structure.

5. The optical scanning-type touch panel as set forth in claim 4,

wherein an outside diameter of said polygon mirror pressing member is smaller than a diameter of an inscribed circle of said polygon mirror.

6. The optical scanning-type touch panel as set forth in claim 3,

wherein an upper portion and/or lower portion of both ends of said polygon mirror are chamfered.

7. The optical scanning-type touch panel as set forth in claim 3,

wherein said polygon mirror is made of nickel or stainless steel.

8. The optical scanning-type touch panel as set forth in claim 7,

wherein an aluminum film and an SiO_2 film are provided on a surface of said polygon mirror.

9. The optical scanning-type touch panel as set forth in claim 3,

wherein a groove is formed at a motor shaft peripheral section of a bearing surface for mounting said polygon mirror and motor.

10. The optical scanning-type touch panel as set forth in claim 9,

wherein said groove formed at the motor shaft peripheral section of the bearing surface for mounting said poly-